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ABSTRACT

The document presents a course outline for the study of natural resources management by junior and senior year high school students. Basic information and practical experiences are offered to the student in the classroom and through several field trips in order to acquire more knowledge in various areas of natural resources and their management. Unit plans for the following areas are presented: (1) white tailed deer and its management in Minnesota; (2) soils--conservation and utilization; (3) Minnesota lakes and rivers and its fishes; (4) Minnesota waterfowl; (5) mammals of Minnesota; (6) our total ecosystem; (7) parks and recreation; (8) maps, mapping, compass use, and land management; (9) aerial stereophotography and its use in natural resources management; (10) upland game bird management; (11) forestry management; (12) forest tree and wood identification; (13) taxidermy of a bird or mammal; (14) air and water pollution; and (15) introduction to Vocational Horticulture Club. Each unit includes the following information: unit objectives; unit outline; student activities (initiatory, developmental, and culminating); and source materials for the instructor and the student. (EC)

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APR 30 1974

COURSE OF STUDY

NATURAL RESOURCES MANAGEMENT

Submitted by:

Brian Ingvalson, Chairman
Vocational Horticulture Department
Fridley Senior High School
Fridley, Minnesota
August 1, 1973

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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FOREWORD

This course of study was developed to be used in Fridley Senior High School for teaching Natural Resources Management to 11th and 12th grade students. It is designed by units which can be used individually or as an entire course. The units are developed by first stating the unit objectives, then the unit outline, the student activities, and last the source materials.

Instructors will find this outline useful by being able to select and use only the units they feel necessary or rearrange the unit order to fit the various seasons of the year.

This course outline should be used along with the course outline available at Staples Area Vocational School on Natural Resources Management by Ingvalson, Brian. This booklet will give you an idea of equipment needed and its sources.

This course of study is designed to be taught in 180-200 hours of instructional classroom and field trip time. About 7 field trips are required by bus away from the school site; however, several field trips are taken on or around the school property to observe, study and provide simulated vocational experiences. Students are required to put in about 75 hours of work outside of class on related homework assignments in order to successfully pass this course.

FRIDLEY VOCATIONAL HORTICULTURE DEPARTMENT
INDEPENDENT SCHOOL DISTRICT #14
FRIDLEY, MINNESOTA

I. Philosophy of Vocational Horticulture Department

The Fridley Senior High School Vocational Horticulture Department will give the student an opportunity for career and occupational exploration while receiving specialized and occupational training in the areas of agribusiness and natural resources.

II. Objectives of Vocational Horticulture Department

After successful completion of one or more courses offered by the vocational horticulture department, the student will:

A. Be more aware of the career opportunities available in the areas of agribusiness and natural resources.

B. Be better able to plan for his selected occupational experiences.

C. Have developed most of the attitudes, specialized knowledges, and skills needed for occupational entry or post-secondary training in the areas studied.

D. Be more competent in human relations.

E. Have attained some of the attitudes, knowledge and skills in a particular occupation he or she is interested in even though the student at that time does not intend on occupational entry or further training in that area.

F. Have developed an attitude of "wanting to work" instead of "having to work."

G. Have been provided the opportunity to spend 75% of course in actual work experience phases of the curriculum.

COURSE DESCRIPTION

NATURAL RESOURCES MANAGEMENT
2 Hour Block - 1 Semester

This course is offered to juniors and seniors only. This course includes basic information and practical experience in several areas of natural resources and their management. Areas of instruction will include: Forestry management and forest tree identification; water, water testing and water management; air pollution studies; soils and land use surveys; Minnesota white-tail deer and its management; Minnesota wildlife, identification and ranges; Minnesota upland gamebirds, identification and management; migratory waterfowl; taxidermy speciments by each student; parks and recreation planning; and, aerial stereophotography as related to natural resources and their management. The course will include several field trips each semester to supplement classroom learning and provide practical experience in related activities. Contests in areas of wildlife, forestry, and land use are an integral part of the course instruction and also are a part of the Horticulture Club activities.

COURSE OBJECTIVE

NATURAL RESOURCES MANAGEMENT

After successful completion of this course, the student will:

1. Be able to identify career opportunities available in the areas of Natural Resource.

2. Have an understanding of the physical requirements needed to be employed in an occupation in the areas of Natural Resource Management.

3. Have developed an appreciation for outdoor life and the upkeep, management, and preservation of nature.

4. Have developed an understanding of industries within the areas of Natural Resource Management.

5. Have many of the necessary specialized skills required for entry into an occupation, and/or post-secondary training in the area of Natural Resource Management.

WHITE-TAILED DEER AND ITS MANAGEMENT IN MINNESOTA

I. Unit Objectives

Upon successful completion of this unit, the student shall:

A. Be able to recall the necessary specific items relating to the white-tailed deer and its management.

B. Interpret and translate the provided information as it relates to deer in Minnesota.

C. Apply the factors discussed in theorizing as to the reasons for past successes or failures in deer management.

D. Recognize the developing patterns and trends in successful deer management.

E. Modify the present deer management techniques and formulate a plan for successful deer management in Minnesota.

F. Evaluate each other's plans, compare them with the plans from the Department of Natural Resources, indicate the logical fallacies of the various plans, and draw their own conclusions regarding successful deer management in Minnesota.

II. Unit Outline

A. History, Distribution and Numbers of Deer

1. Introduction
2. Recent Deer Populations
3. Deer and Forest Distribution
4. Minnesota Forest Areas
5. Deer Populations of the Major Deer Habitats
6. Hunting Regulations - Past and Present

B. Natural History of the White-Tailed Deer

1. Relationships
2. General anatomy
3. The fawn and its mother
4. Rutting season
5. Growth of the antlers

C. Food Habits of the Minnesota Deer

1. Introduction
2. Food preferences from stomach analysis
3. Food preferences from browse studies
4. Chemical analysis of deer food shrubs
5. Deer damage to crops
6. Controlling deer damage

D. Sex and Age Ratios of Deer, Weights and Physical Condition

1. Determination of sex
2. Determination of age
3. Weights of deer
4. Record heads of deer
5. Sex and age of deer
6. Fawn production

E. Natural Factors Limiting Deer Production

1. Deer losses due to malnutrition
2. Deer browse, browse surveys, and deer yards

3. Effects of malnutrition on adult deer, young and fetuses

4. Artifical feeding of deer

5. Predators and deer

6. Parasites and disease

7. Food competitors

8. Overpopulation as a natural mortality factor

F. Management of Deer Populations

1. Counting the deer

2. Deer trapping and tagging

3. Methods of increasing deer browse

4. Providing deer food by cutting and planting

5. Planting to improve winter cover

6. Planting guide for opening

7. Deer exclosure

8. Harvesting deer crops

9. Firearm deer seasons

10. Bow and arrow deer hunting

11. Law enforcement

G. Aesthetic and Economic Values of Deer

1. Money spent on hunting

2. Money spent on processing venison and tanning of deer hides

3. Deer in the future

III. Student Activities

A. Initiatory

1. Discussion of deer stories - fact and fiction

2. Disputing of fables and presentation of unit objectives

B. Developmental

1. Textbook lecture and discussion

2. Movies and slides on deer management

3. Field trip to study deer sign and habitat

4. Study to deer jaws and cut browse in the classroom

5. Formulate a long term deer management plan for Minnesota, compare and indicate possible fallacies in each others

C. Culminating

1. Written examination testing the first 5 levels of stated objectives

2. A revised plan for long term deer management in Minnesota

IV. Source Materials

A. Instructor

1. The White-Tailed Deer of Minnesota, Technical Bulletin No. 5, Minnesota Department of Conservation, St. Paul, Minn. 55101

2. The 1972 Deer Season, Information Leaflet from Minnesota Department of Conservation, St. Paul, Minn. 55101

3. Wildlife Management and Conservation, Trefethen, James B., D.C. Heath and Company, Boston, Mass., 1964

4. General Instructions for Deer Yard Improvement Projects and Emergency Winter Care of Deer, Minnesota Department of Conservation, St. Paul, Minn. 1969

5. Wolves of Isle Royal, Mech, L. David, Superintendent of Documents, U.S. Govt. Printing Office, Washington, D.C. 20402, 1966

B. Student

1. Same as Nos. 1, 2, and 3 of instructor resources.

SOILS - CONSERVATION AND UTILIZATION

I. Unit Objectives

Upon successful completion of this unit, the student shall:

A. Recall specific, necessary information relating to Minnesota soils, its formation, development, use and limitations.

B. Interpret information provided in determining land capability classes in Minnesota.

C. Predict the probable outcomes of correctly and incorrectly using soils in nature.

D. Analyze a given site of land and list its capabilities and restrictions for agricultural and urban uses.

II. Unit Outline

A. Introduction to soils in Minnesota

1. Minnesota

   a. Glaciers
   b. Other

2. Metropolitan

3. Anoka County

B. Soils and their classification

1. Forces shaping the landscape

2. Soil formation

   a. Parent material
   b. Climate
   c. Vegetation
   d. Time
   e. Topography

3. Soil properties

   a. Texture
   b. Structure

c. Organic matter
d. Percolation
e. Permeability
f. Bearing strength

4. Soil classification

C. Evaluation of Minnesota soils

1. Soil horizons

2. Degree of erosion

3. Surface soil structure

4. Surface soil color

5. Subsoil color and internal drainage

6. Soil texture

7. Associated fature

8. Land use capability class

9. Available water holding capacity

10. Drought possibility due to soil factors

11. Fertilizer

12. Seedbed preparation

13. Temperature

14. Need for erosion control

15. Drainage required

16. Percolation

17. Permeability

18. Bearing strength

19. Drainage fields

20. Construction properties

III. Student Activities

A. Initiatory

1. "Soil" or "Dirt" - ??

2. Description of soil and demonstration

B. Developmental

1. Discussion on texts

2. Demonstrations

a. Making soil
b. Particle size and pore spaces
c. Permeability
d. Seperates of soil
e. Capillary water
f. Water holding capacity
g. Stream table

3. Determination of soil texture by feel by students

4. Determination of soil color

5. Interpretation of soil information on score cards

6. View appropriate slides and movies

7. Field trip to study land form and profiles

C. Culminating

1. Written examination on soils and properties

2. Practical exam on color and texture

3. Interpretation of information test on land judging score cards

IV. Source Materials

A. Instructor

1. Any good basic soils text

2. 25 Years of Ecological Progress, Anoka Soil & Water Conservation District, Anoka, Minn. 55303

3. Teaching Soil & Water Conservation, U.S. Department of Agriculture, Soil Conservation Service, U.S. Govt. Printing Office, 1957.

4. Soils of Minnesota, Arneman, H. F., Agricultural Extension Service, University of Minnesota, St. Paul, Minn. 55101, 1957.

5. Soils of the Twin Cities Metropolitan Area, Extension Bulletin 320, Agricultural Extension Service, University of Minnesota, St. Paul, Minn. 1967

6. Land Judging Scorecard Instructions, Swan, James, Agricultural Extension Service, University of Minnesota, St. Paul, Minn.

B. Student

1. Same as Nos. 2, 4, 5, and 6 of Instructor Resources.

MINNESOTA LAKES AND RIVERS AND ITS FISHES

I. Unit Objectives

Upon successful completion of this unit, the student shall:

A. Recall specific information relating to Minnesota lakes, their characteristics and formations.

B. Recall specific information relating to eutrophication of lakes and swimmers itch.

C. Interpret information provided on specific lakes regarding depth, temperature, oxygen levels, etc.

D. Theorize as to the type of fish to be found in various types of waters in Minnesota, based on lake studies.

E. Recall specific information relating to various species of fish found in Minnesota.

F. Recognize from live specimens or pictures 20 common Minnesota fishes.

G. Use with necessary skills water testing and sampling equipment.

II. Unit Outline

A. Introduction to lakes and streams

B. Lake waters

1. Formation, depth temperature, oxygen levels, etc.

2. Eutrophication of lakes

3. Cycle of seasons in lakes

C. Life in lakes

D. Cold water fishes - characteristics and requirements

1. Family identifying characteristics

2. Specie identification

a. Trout

E. Warm water fishes - characteristics and requirements

1. Family identification

2. Specie identification

a. Perch family
b. Sun fish family
c. Pike family

F. Other fishes

1. Minnow family

2. Sucker family

3. Catfish family

G. Diseases and parasites of fish

H. Fish management

I. Water sampling techniques

J. Water testing techniques

III. Student Activities

A. Initiatory

1. Discussion of fish stories - fact or fiction

2. Discussion of types of lakes

B. Developmental

1. Read and discuss reading assignment in Fish & Wildlife in Minnesota.

2. View slides on lakes in Minnesota.

3. Review eutrophication and swimmers itch.

4. Complete worksheets on assigned fishes in Minnesota.

5. View slides on fish identification.

6. Complete handout on names of parts of a fish.

7. Sample and test various waters - lake and stream

8. Several field trips to use equipment, test water, and observe habitats.

C. Culminating

1. Written exam on all levels of stated objectives.

2. Practical examination on fish identification.

IV. Source Materials

A. Instructor

1. Fish & Wildlife in Minnesota, Moyle, John B., Minnesota Education Association, St. Paul, Minn. 1969.

2. Various Information Leaflets, Minnesota Department of Conservation, St. Paul, Minn. 55101.

3. Fishes, Golden Nature Guide, Western Publishing Co., New York.

4. Pond Life, Golden Nature Guide, Western Pub. Co., New York.

B. Student

1. Same as nos. 1 and 2 of Instructor Source Material.

MINNESOTA WATERFOWL

I. Unit Objectives

Upon successful completion of this unit, the student shall:

A. Recall the identifying characteristics, feeding characteristics, habitat and life history of a required number of waterfowl in Minnesota.

B. Know the state and federal hunting regulations applying to waterfowl in Minnesota.

C. Interpret duck management techniques as it relates to hunting regulations and conservation of waterfowl.

D. Predict the type and numbers of ducks that would stop over and nest in local lakes and waters.

II. Course Outline

A. Introduction

B. Classification of waterfowl

1. Geese and swans

2. Ducks

a. Diving
b. Dabbling

3. Other

C. Identification of waterfowl

1. Fall plumage

2. Male and female

3. Types of habitat

D. Production of waterfowl

1. Habitat requirements

2. Migratory routes

3. Life history of various birds

E. Detailed study of the mallard

F. State and federal waterfowl conservation agencies

G. State and federal hunting regulations

H. Economic impact of waterfowl in Minnesota

III. Student Activities

A. Initiatory

1. Pre-test on duck identification and knowledge

2. Discussion stories on duck hunting

B. Developmental

1. Department of Natural Resources Management leaflets serve as text and reference material.

2. Completion of worksheet on parts of a duck and names of feathers.

3. Movies and slides on duck management

4. Instructor prepared transparencies on duck classification

5. Field trip to local lakes to study duck habitat and identification and collect water plants eaten by waterfowl.

C. Culminating

1. Written examination testing on all three levels of stated objectives.

2. Hand in collection of water plants as collected on field trip. Plants will be on 8-1/2 x 11 paper and identified and classified as to food value.

IV. Source Materials

A. Instructor

1. Gamebirds, Golden Press, Western Pub. Co., New York.

2. Ducks at a Distance, U.S. Dept. of the Interior Fish and Wildlife Service, U.S. Govt. Printing Office.

3. Migration of Birds, Circular No. 16, Fish & Wildlife Service, U.S. Department of the Interior, 1950.

4. Department of Natural Resources Information Leaflets reprinted from Technical Bulletin No. 7.

5. Waterfowl in Minnesota, Technical Bulletin No. 7, Minnesota Dept. of Conservation, 1964.

6. Ducks and Land Use in Minnesota, Technical Bulletin No. 8, Minnesota Department of Conservation, 1964.

7. Underwater and Floating - Leaved Plants of the United States and Canada, Resource Publication No. 44, U.S. Department of Interior, 1967.

B. Student

1. Same as Nos. 2, 4, 5, and 7 from instructor list.

MAMMALS OF MINNESOTA

I. Unit Objectives

Upon successful completion of this unit, the student shall:

A. Recognize 40 common Minnesota mammals in the wild or from pictures or sketches.

B. Recognize 20 common Minnesota mammal tracks in the wild or from mounts.

C. Be familiar with the identifying characteristics of the major mammal families in Minnesota.

II. Unit Outline

A. Introduction to mammals and tracking.

B. Discussion of 80 different kinds of Minnesota mammals.

C. Identifying characteristics of 40 Minnesota mammals.

D. Identifying characteristics and making of replicas of 20 mammals in Minnesota.

III. Student Activities

A. Initiatory

1. Discussion and listing of as many mammals in Minnesota as possible.

B. Developmental

1. Read and discuss book entitled "Minnesota's Mammals - Eighty Different Kinds"

2. Do worksheet on above booklet.

3. Discuss major families and identifying characteristics of same.

4. Display and list identifying characteristics of the required 40 common Minnesota mammals.

5. Have students make track samples of 20 common Minnesota mammals and label as to name and family with spacing and recorded.

6. View appropriate movies and slides.

7. View habitats on field trips.

C. Culminating

1. Practical examination on 20 tracks and 40 mammals.

2. Hard in worksheet for grade.

IV. Source Materials

A. Instructor

1. Minnesota's Mammals - Eighty Different Kinds, State of Minn., Department of Conservation, St. Paul, Minn. 55101.

2. Assorted books from local library on information relating to mammals.

3. Tracks and Tracking, Kit from NASCO, Ft. Atkinson, Wisc.

4. Mammals, Golden Press, Western Pub. Co., New York.

B. Student

1. Same as nos. 1, 2, and 3 from instructor list.

OUR TOTAL ECOSYSTEM

I. Unit Objectives

Upon successful completion of the unit, the student shall:

A. Have familiarity with our total ecosystem and be able to recall the specific relationships of the various portions and know the definitions of these various portions.

B. Interpret the relationships of our ecosystem in the form of a food-web.

C. Apply the provided knowledge in analyzing various micro-ecosystems.

II. Unit Outline

A. Definition of ecology and related sciences.

B. Levels with the ecological structure.

C. The ecosystem, "The balance of nature."

D. Principles and concepts dealing with the ecological approach to conservation.

E. Niche verses habitat.

F. Pyramid of life

G. Trophic levels

H. Ecological equivalents

I. Zonation of life

J. Plant succe_sion - forests

K. Plant succession - marsh to prairie.

L. Construction of a food web from reading assignment

M. Plant community study on prairie grass land.

N. Micro-succession study of a rotted log.

III. Student Activities

A. Initiatory

1. Presentation of worksheet on ecology relationships.

B. Developmental

1. Complete and hand in worksheet on ecology relationships.

2. Read and complete a food web from the book Wild Season, Eckert, Allan W.

3. Field trip to study the micro-succession of a rotten log.

4. Field trip to do a plant community study on prairie plants.

5. View appropriate movies and slides.

C. Culminating

1. Hand in a written evaluation and summary of micro-succession study of a log.

2. Hand in a written evaluation and summary of plant community study.

3. Hand in completed food web.

4. Hand in completed worksheet.

IV. Source Materials

A. Instructor

1. True, The Man's Magazine, (condensed version of novel - Wild Season), May, 1967.

2. Micro-Succession Study of Rotten Log, Instructor Hand Out.

3. Plant Ecology Workbook, Curtis, J. T. and Grant Cottam, Burgess Publishing Co., Minneapolis, Minn., 1969.

4. Worksheet "Ecological Approach" developed by Elwood Wessman, Brainerd Area Vocational School, Brainerd, Minn.

5. Ecology Studies

6. Facts From Our Environment, Potash Institute of North America, Atlanta, Ga. 30329.

B. Student

1. Same as nos. 1, 3 and 4 of instructor source material.

PARKS AND RECREATION

I. Unit Objectives

Upon successful completion of this unit, the student shall:

A. Be familiar with the requirements of a city parks program.

B. Be familiar with the steps necessary for the development, implementation and operation of a private recreational business in Minnesota.

C. Interpret and comprehend some of the business procedures required in private recreational business operation.

D. Apply the theories of parks and recreation in a project to be submitted for a grade.

E. Analyze the resultant projects as to logic and practicality.

II. Unit Outline

A. Introduction to city parks management.

1. Requirements of parks

2. Cost of operation

3. Occupational requirements

4. Developmental procedures

B. Introduction to state recreational private activities

1. Location

2. Land acquisition

3. Borrowing capital

4. Initial investments

5. Annual fixed costs

a. Principal repayment
b. Interest charges
c. Taxes
d. Depreciation

6. Annual variable costs

   a. Salaries
   b. Utilities
   c. Insurance
   d. Advertising
   e. Repairs
   f. Upkeep
   g. Major improvements
   h. Other

7. Income

   a. Gross income
   b. Net income
   c. Labor income

8. Summary of long-term project

C. Summary of unit

III. Student Activities

A. Initiatory

1. Discussion on local park system.

2. Discussion on camping and campgrounds.

B. Developmental

1. Guest lecturers from Parks and Recreation Department.

2. Tour site of proposed park on field study.

3. Discuss teacher handouts on description of assignment and worksheets.

4. Students will choose one of two projects for culminating activity.

   a. Drawing and complete description of proposed park in city and a report on the existing parks system.
   b. Drawing and complete description and business analysis of a private recreational area in North Central Minnesota.

5. Appropriate slides and movies.

C. Culminating

1. Scale drawing and ledger for selected topic.

2. Description and analysis of selected topic.

IV. Source Material

A. Instructor

1. Rural Recreation for Profit, Smith, Clodus R., Partain, L. E. and Champlin, J. R., Interstate Printers and Publishers, Inc., Danville, Ill., 1968.

B. Student

1. Lecture notes
2. Instructor handouts
3. Guest speaker
4. Slides and movies

MAPS, MAPPING, COMPASS USE, AND LAND MEASUREMENT

I. Unit Objectives

Upon successful completion of this unit, the student shall:

A. Identify the types of map construction, contours symbols, scales, profiles, tools and equipment used in the unit.

B. Extrapolate township descriptions by range and township lines and interpret the legal description of any parcel of land.

C. Apply his learnings to map compilation and reading.

D. Distinguish between and among the various types of maps and their uses and the tools necessary for their development.

E. Construct map profiles from contours and construct a "closed traverse" with the use of proper tools.

F. Evaluate the various methods of measurement and indicate the method to be used in various situations.

II. Unit Outline

A. Introduction to map reading and map types.

1. Azmithal
2. Conical
3. Pyramidal

B. Map symbols

C. Latitude and longitude

D. Scale

E. Contour line

1. Stream and valley
2. Profile
3. Depression
4. Hill and valley
5. Hill-depression-valley

F. Land measurements and legal descriptions

1. Legal descriptions - range and township lines

2. Township numbering and descriptions

3. Legal descriptions of parcels of land

4. Methods of land measurements

   a. Pacing and pace factor determination
   b. Odometer
   c. Chaining
   d. Stadia

5. Calculations of land areas

   a. Pacing
   b. Chaining

G. Compass use in mapping

1. General compass orientation

2. Use of a "Closed Traverse" and construction by use of compass and pace factor.

3. Closing the error on a closed traverse known as "error of closure."

H. Use of the "dumpy" level in surveying

I. Occupations and job opportunities and requirements

III. Student Activities

A. Initiatory

1. Discussion of uses and original surveys of U.S.

B. Developmental

1. Overhead transparencies on mapping and symbols.

2. Overhead transparencies on land measurements and legal descriptions.

3. Classroom and field exercises on field trips

a. Contour line with hand level
b. Closed traverse with compass and pace factor
c. Chaining
d. Use of dumpy level
e. Constructing map profiles from contour maps

C. Culminating

1. Practical examination testing the stated objective levels.

IV. Source Materials

A. Instructor

1. Land Measurement - overhead transparencies - Vocational Education Production, California.

2. Be Expert with Map and Compass, Kjellstrom, Bjorn, American Orienteering Service, LaPorte, Indiana 46350.

3. Compass Land Surveying, Sipe, F. Henry, McClain Printing Company, Parsons, West Virginia 26287.

4. Map Reading Series, Overhead transparencies, Hubbard Scientific Company, Northbrook, Illinois.

5. Interpretation of Aerial Photographs, Avery, T. Eugene, Burgess Pub. Co., Minneapolis, Minn. 55415.

B. Student

1. Various handouts from instructor

2. Equipment

a. Protractor
b. Compass
c. 45 degree triangle
d. Chaining tape and pins

AERIAL STEREOPHOTOGRAPHY AND ITS USE IN NATURAL RESOURCES MANAGEMENT

I. Unit Objectives

Upon successful completion of this unit, the student shall:

A. Be able to recall the specific items necessary for understanding aerial stereophotography.

B. Have possession of a minimum knowledge of the procedures for producing and viewing aerial photographs.

C. Interpret aerial photographs with and without the use of stereoscopes.

D. Apply the phenomena of aerial photography to natural resources management.

II. Unit Outline

A. Introduction

1. History
2. Modern day methods
3. Outline procedure used in photographing

B. Equipment and photographs for viewing

1. Stereograms
2. Stereoscopes

C. Viewing of photographs

1. Alignment
2. Retraining of eyes
3. Height exaggeration

D. Mathematical computations

1. Scale
2. Conversion factors

E. Construction of a contour map

1. See unit on Maps and Mapping

III. Student Activities

A. Initiatory

1. Allow students to observe photographs and orientate them on use of equipment.

B. Developmental

1. Presentation of introductory information on unit overhead transparencies.
2. Interpretation of required aerial stereograms.

C. Culminating

1. Written practical examination testing on the three levels of stated objectives.

IV. Source Materials

A. Instructor

1. Interpretation of Aerial Photographs, Avery, T. Eugene, Burgess Publishing, Minneapolis, Minn. 55415.

2. Aerial Stereo Photographs, Wanless, Harold R., Dept. of Geology, University of Illinois (available through NASCO)

B. Student

1. Same as nos. 2 from instructor resources.

UPLAND GAME BIRD MANAGEMENT

I. Unit Objectives

Upon successful completion of this unit, the student shall:

A. Be able to recall the necessary specific items relating to upland game and its management in Minnesota.

B. Interpret the provided information as it relates to upland game, especially to the ring-necked pheasant and the ruffed grouse in Minnesota.

C. Apply the factors discussed in theorizing as to the past successes and failures in upland game management in Minnesota.

D. Distinguish between successful and non-successful management techniques in upland game management.

II. Unit Outline

A. Minnesota's Land

1. Land and water
2. Soil types
3. Vegetative zones

B. Upland game in Minnesota

1. Types and identification
2. Distribution and numbers

C. Management and life history of specific birds

1. Sharp-tailed grouse
2. Hungarian partridge
3. Bob-white quail
4. Chuckar partridge
5. Spruce hen
6. Chinese ring-necked pheasant
7. Ruffed grouse

D. Detailed information on ruffed grouse and ring necked pheasants

1. Role of the farmer and pheasant population
2. Open verses closed seasons
3. Artifical verses natural habitats.

4. Role of Department of Natural Resources in Upland Game Bird Management

5. Comparison of ruffed grouse and pheasant on research studies and management techniques.

III. Student Activities

A. Initiatory

1. Discussion of hunting stories - past and present
2. Presentation of unit objectives

B. Developmental

1. Read and discuss text material
2. Discussion and evaluation of management
3. Slides and visuals on identification

C. Culminating

1. Written examination testing on the stated written objectives.

III. Source Materials

A. Instructor

1. Field Book of Eastern Birds, Nausman, G. P. Putnam Sons, New York, 1946.

2. A Field Guide to Western Birds, Peterson, Houghton Mifflin Company, Boston, 1969.

3. Birds, Zim and Gabrielson, Golden Press, New York, 1956.

4. Birds Over America, Peterson, Dodd, Mean and Co., New York, 1964.

5. Fish and Wildlife in Minnesota, Minnesota Education Assoc., St. Paul, 1969.

6. Information Leaflets from the Minnesota Department of Natural Resources.

a. Number 13, The Ringneck Pheasant in Minnesota.
b. Number 14, Ruffed Grouse in Minnesota.
c. Number 15, Sharp-tailed Grouse in Minnesota.
d. Number 16, Hungarian Partridge in Minnesota.
e. Number 17, Bob White Quail in Minnesota.
f. Number 27, Chukar Partridge in Minnesota.
g. Number 51, Spruce Hen in Minnesota.
h. Number 52, Closed Season - No Boon to Ruffed Grouse.
i. Number 53, Pheasants, Too, Need Harvesting, Kimble.
j. Number 86, Some Facts on Pheasant Stocking Programs.
k. A Discussion of Ruffed Grouse Management Problems in Northern Minnesota, Gullion.

7. Game birds, Golden Press, New York.

B. Student

1. Same as Nos. 5 and 6 in the instructor list.

FORESTRY MANAGEMENT

I. Unit Objectives

Upon successful completion of this unit, the student shall:

A. Recall forestry statistics as related to economics, use, and species.

B. Have knowledge of the basic skills required in the forest management business in Minnesota.

C. Have constructed and be able to use a forester's cruizing stick.

D. Recognize and preduct outcomes of various stages of forest succession.

E. Analyze and recommend the proper types of forest management techniques in a given situation.

F. Be familiar with forest plantation management.

G. Use all forest management tools with the necessary amount of skill and competence.

II. Unit Outline

A. Introduction to Minnesota Forestry Facts.

B. Opportunities in forestry

C. Forestry yesterday and today

D. Characteristics and growth requirements of forest trees

E. The composition and distribution of forests

F. The practice of silviculture

G. Measuring the forest

H. Christmas tree plantation management

1. Wildling balsam culture
2. Basic plantation business management
3. Per acre costs and returns
4. 40 acre flow chart

I. Construction of cruizing stick

1. Merritt hypsometer
2. Biltmore stick
3. Scribner rule
4. Rule

J. Use of tools and application

1. Cruizing prism
2. Increment bore
3. Doyle Scribner and International log scale sticks
4. Foresters' staff compass
5. Clinometer
6. Hand level (Abney)
7. Pruning saws
8. Chain saws
9. Planting bar
10. Peavey
11. Cruizing stick
12. Calipers
13. Diameter tape

III. Student Activities

A. Initiatory

1. Introductory statements and questions, such as clear cutting, wolf trees, amount of timber, etc.

B. Developmental

1. Discussion on textbook reading assignments.
2. Construct and use cruizing stick.
3. Field trip to use equipment and study forestry in the field.

C. Culminating

1. Written and practical examination covering the four levels of stated objectives and a report containing new information learned and new skills acquired on the field trip.

IV. Source Materials

A. Instructor

1. Notes and handouts from Brainerd Vocational School short course on Forestry.

2. Essentials of Forestry Practice, Stoddard, Charles H., Ronald Press Company, New York, 1968.

3. Forestry for Minnesota Schools, Minnesota Education Assoc., Minneapolis, Minnesota 1972.

4. Silvics of Forest Trees of the United States. U.S. Dept. of Agriculture, Forest Service, 1965.

B. Student

1. Handouts from instructor

2. Essentials of Forestry Practice, Stoddard, Charles H. Ronald Press Company, New York, 1968.

3. Forestry for Minnesota Schools, Minnesota Education Assoc., Minneapolis, Minnesota, 1972.

FOREST TREE AND WOOD IDENTIFICATION

I. Unit Objectives

Upon successful completion of this unit, the student shall:

A. Recognize and identify in writing a required number of tree species from a leaf, wood or bark sample.

B. Interpret tree and wood "keys" for identification study.

C. Apply the information in "keying-out" unknown specimens of tree species.

D. Recognize developing patterns in the tree identification process.

II. Unit Outlines

A. Introduction to identification terminology

B. How to use a key

1. Tree leaf key
2. Tree wood key
3. Tree bark and general shape key
4. Tree twig and bud key

C. Keying out and identifying features of each of the assigned trees

D. Combining the leaf, wood, bark and bud and shape for total tree identification

III. Student Activities

A. Initiatory

1. Pretest on tree identification

B. Developmental

1. Use of provided keys and handouts
2. Keying out species in classroom
3. Field trip to identify area trees
4. Viewing slides and mounts in classroom

C. Culminating

1. Practical examination testing only on ability to key out specimens and identify all of the required species.

IV. Source Materials

A. Instructor

1. Tree Identification

2. Minnesota's Forest Trees, Extension Bulletin 363, Agriculture Extension Service, University of Minn., St. Paul, 1971.

3. Forestry for Minnesota Schools, Minnesota Education Assoc., St. Paul, 1971.

4. Key to Evergreen and Deciduous Trees of the Lower Half of Minnesota.

5. Fruit and Trig Key, Harlow, Dr. William M., Dover Publications Inc., New York.

6. Instructor Prepared Mounts

7. Woody Plant Seed Manual, U.S. Dept. of Agriculture Forest Service.

B. Student

1. Same as nos. 2, 3, 4, 5, 6 of instructor materials

TAXIDERMY OF A BIRD OR MAMMAL

I. Unit Objectives

Upon successful completion of this unit, the student shall:

A. Have possession of a minimum knowledge of the techniques in taxidermy.

B. Interpret written instructions into practical application and apply these to a specimen.

C. Analyze and distinguish to quality of the end product on the specimen.

II. Unit Objectives

A. Introduction

1. History and background
2. Attitudes

B. Collecting specimens

1. Killing live birds
2. Care of the specimen
3. Field notes

C. Tools and materials

D. Preparation for skinning

1. The skinning operation
2. Detaching the tail
3. Skinning the head
4. Skinning the legs
5. Skinning the wings

E. Skinning the heads of large birds

F. Keeping feathers clean

G. Removing fat from skins

H. The proper bones to use

I. Preparing skins for future mounting

J. Artificial eyes

K. Making the artificial body

1. Wire required
2. Constructing the body
3. Making the neck
4. Leg wires
5. Placing the body in the skin
6. Attaching leg wires
7. Leg attachment
8. Sewing up incision
9. Setting the wings
10. Posing the bird
11. Setting the eyes
12. Filling the throat
13. Winding specimens
14. Restoring colors

L. Mounting birds with spread wings

M. Ready made artificial bodies

N. Other types of taxidermy

III. Student Activities

A. Initiatory

1. Review mounted specimens present
2. Discuss past experiences student and instructor

B. Developmental

1. Hand out on procedure
2. View slides and possible a video tape on procedure
3. Each student do a complete mount on a bird

C. Culminating

1. Hand in a completed bird

IV. Source Materials

A. Instructor

1. Taxidermists' Supplies, J. W. Elwood Supply Co., Inc., 1202 Harney, Box 3507, Omaha, Nebraska 68103.

2. Lessons in Taxidermy, Books 1-10, J. W. Elwood, Northwestern School of Taxidermy, Omaha, Nebraska 68102.

3. Mounting a Bird, Dr. Echternacht, Brainerd, Minn.

B. Student

1. Mounting a Bird, Dr. Echternacht, Brainerd, Minn.

AIR AND WATER POLLUTION

I. Unit Objectives

Upon satisfactory completion of this unit, the student shall:

A. Be familiar with the causes, consequences, and methods of control of air and water pollution.

II. Unit Outline

A. Introduction to air pollution

B. History of air pollution

C. Smog

D. Ventilation

E. Types of pollutants

1. Gases
2. Aerosols
3. Odors

F. Control of pollutants from industry

G. Control of photochemical smog

H. Composition of photochemical smog

I. Vapor control

J. Exhaust control

K. Lead in gasoline

L. Exhaust from diesel engines

M. Air Quality Act of 1967

N. Introduction to water pollution

O. History of water pollution

P. Municipal sewage

Q. Water re-use

R. Water treatment systems

III. Student Activities

A. Initiatory

1. What's the Problem? Discussion.

B. Developmental

1. Read and discuss reading assignment
2. View slides and movies on subject

C. Culminating

1. Quiz over basic details

IV. Source Materials

A. Instructor

1. Conserving Our Waters, American Petroleum Institute, 1271 Avenue of the Americas, New York, 10020.

2. Clearing the Air, American Petroleum Institute, 1271 Avenue of the Americas, New York, 10020.

B. Student

1. Same as nos. 1, 2 above.

INTRODUCTION TO VOCATIONAL HORTICULTURE CLUB (FFA)

I. Unit Objectives

After successful completion of this unit, the student shall:

A. Identify the basic characteristics associated with Vocational Horticulture Club.

B. Decide whether he or she can gain from membership in the Club.

C. Join and participate in the activities of the Club to the extent he or she desires.

II. Unit Outline

A. Introduction

1. Why Vocational Horticulture Club?
2. Affiliation with State, National

B. Purpose

1. For the individual
2. For the group as a whole

C. Activities

1. Contests
2. Leadership
3. Social
4. Civic

D. Officers and their functions

E. Who is eligible

F. Dues

III. Source Material

A. Instructor

1. FFA Manual
2. Local FFA Handbook

B. Student

1.
2.